

CLAIMS

[1] A remote ultrasonic diagnostic subject-side apparatus that is used in a remote ultrasonic diagnostic system, comprising: an examiner-side
5 apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the subject-side apparatus comprising:

an ultrasonic wave transmission/reception portion for transmitting an
10 ultrasonic echo that is generated from an electroacoustic converting means driven by a transmission pulse, and receiving an ultrasonic echo reflected by an inside of the subject;

an image generation portion for generating ultrasonic image data from an ultrasonic signal that is received by the ultrasonic wave
15 transmission/reception portion;

a cine memory for sequentially storing the ultrasonic signal that is received by the ultrasonic wave transmission/reception portion per each frame; and

a communication line interface for reproducing, from the cine memory,
20 the frame that is requested to be retransmitted by the examiner-side apparatus after freezing, and retransmitting the frame to the examiner-side apparatus via the communication line.

[2] A remote ultrasonic diagnostic examiner-side apparatus that is used
25 in a remote ultrasonic diagnostic system, comprising: an examiner-side apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the examiner-side apparatus comprising:

30 a communication line interface for requesting a communication line

interface of the subject-side apparatus to retransmit a frame to be reproduced so as to retransmit the frame via the communication line, every time after freezing when moving a pointer for designating the frame to be reproduced from a cine memory that sequentially stores an ultrasonic signal received by an ultrasonic wave transmission/reception portion of the subject-side apparatus per each frame;

an image formation portion for forming an ultrasonic image of the retransmitted frame; and

a displaying means for displaying the ultrasonic image that is formed by the image formation portion.

[3] A remote ultrasonic diagnostic system in which the remote ultrasonic diagnostic subject-side apparatus according to Claim 1 and the remote ultrasonic diagnostic examiner-side apparatus according to Claim 2 are connected via a communication line.

[4] The remote ultrasonic diagnostic system according to Claim 3, wherein

the communication line interface of the subject-side apparatus retransmits at least a part of all frames that are accumulated in the cine memory of the subject-side apparatus to the examiner-side apparatus in a background, after freezing, and

the examiner-side apparatus comprises the cine memory for storing an ultrasonic image of the frame that is retransmitted after the freezing.

[5] The remote ultrasonic diagnostic system according to Claim 3, wherein the subject-side apparatus comprises a displaying means for displaying an ultrasonic image that is retransmitted to the examiner-side apparatus.

[6] A remote ultrasonic diagnostic subject-side apparatus that is used in a remote ultrasonic diagnostic system, comprising: an examiner-side apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the subject-side apparatus comprising:

an ultrasonic wave transmission/reception portion for transmitting an ultrasonic echo that is generated from an electroacoustic converting means driven by a transmission pulse, and receiving an ultrasonic echo reflected by an inside of the subject;

an image generation portion for generating ultrasonic image data from an ultrasonic signal that is received by the ultrasonic wave transmission/reception portion;

a cine memory for sequentially storing the ultrasonic signal that is received by the ultrasonic wave transmission/reception portion per each frame;

a displaying means for reproducing, from the cine memory, the frame that is requested to be retransmitted in the subject-side apparatus after freezing, and displaying the frame as an ultrasonic image; and

a communication line interface for retransmitting the frame that corresponds to the ultrasonic image displayed on the displaying means to the examiner-side apparatus via the communication line.

[7] A remote ultrasonic diagnostic examiner-side apparatus that is used in a remote ultrasonic diagnostic system, comprising: an examiner-side apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the examiner-side apparatus comprising:

a communication line interface for receiving a frame that is

retransmitted from a communication line interface of the subject-side apparatus via the communication line, after freezing;

an image formation portion for forming an ultrasonic image of the retransmitted frame; and

5 a displaying means for displaying the ultrasonic image that is formed by the image formation portion.

[8] A remote ultrasonic diagnostic system in which the remote ultrasonic diagnostic subject-side apparatus according to Claim 6 and the remote
10 ultrasonic diagnostic examiner-side apparatus according to Claim 7 are connected via a communication line.

[9] A remote ultrasonic diagnostic subject-side apparatus that is used in a remote ultrasonic diagnostic system, comprising: an examiner-side
15 apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the subject-side apparatus comprising:

an ultrasonic wave transmission/reception portion for transmitting an
20 ultrasonic echo that is generated from an electroacoustic converting means driven by a transmission pulse, and receiving an ultrasonic echo reflected by an inside of the subject;

an image generation portion for generating ultrasonic image data by performing a filtering process with respect to an ultrasonic signal that is
25 received by the ultrasonic wave transmission/reception portion; and

a communication line interface for transmitting the ultrasonic image data that is generated by the image generation portion to the examiner-side apparatus via the communication line.

30 [10] A remote ultrasonic diagnostic examiner-side apparatus that is used

in a remote ultrasonic diagnostic system, comprising: an examiner-side apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

5 the examiner-side apparatus comprising:

 a communication line interface for receiving an ultrasonic image data that is transmitted from a communication line interface of the subject-side apparatus via the communication line;

 a scan converting means for converting the number of scanning lines
10 of the received ultrasonic image data; and

 a displaying means for displaying the ultrasonic image data that is scanned and converted by the scan converting means.

[11] A remote ultrasonic diagnostic system in which the remote ultrasonic
15 diagnostic subject-side apparatus according to Claim 9 and the remote ultrasonic diagnostic examiner-side apparatus according to Claim 10 are connected via a communication line.

[12] The remote ultrasonic diagnostic system according to Claim 11,
20 wherein the displaying means of the examiner-side apparatus displays, as a real-time ultrasonic dynamic image, a real-time ultrasonic dynamic image that is transmitted from the subject-side apparatus.

[13] The remote ultrasonic diagnostic system according to Claim 12,
25 wherein the subject-side apparatus comprises:

 a scan converting means for converting the number of scanning lines of the ultrasonic image data that is generated from the image generation portion; and

 a displaying means for displaying the ultrasonic image data that is
30 scanned and converted by the scan converting means.

[14] A remote ultrasonic diagnostic subject-side apparatus that is used in a remote ultrasonic diagnostic system, comprising: an examiner-side apparatus by which an examiner performs a diagnosis with respect to a
5 subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the subject-side apparatus comprising:

an ultrasonic wave transmission/reception portion for transmitting an ultrasonic echo that is generated from an electroacoustic converting means
10 driven by a transmission pulse, and receiving an ultrasonic echo reflected by an inside of the subject;

an image generation portion for generating ultrasonic image data by performing a filtering process with respect to an ultrasonic signal that is received by the ultrasonic wave transmission/reception portion;

15 a cine memory for sequentially storing the ultrasonic signal that is received by the ultrasonic wave transmission/reception portion per each frame; and

a communication line interface for reproducing, from the cine memory, the frame that is requested to be retransmitted by the examiner-side
20 apparatus after freezing, and retransmitting the frame to the examiner-side apparatus via the communication line.

[15] A remote ultrasonic diagnostic examiner-side apparatus that is used in a remote ultrasonic diagnostic system, comprising: an examiner-side
25 apparatus by which an examiner performs a diagnosis with respect to a subject in a remote location via a communication line by using an ultrasonic image; and the subject-side apparatus on the subject side,

the examiner-side apparatus comprising:

a communication line interface for requesting a communication line
30 interface of the subject-side apparatus to retransmit a frame to be reproduced

and retransmitting the frame via the communication line, every time after freezing when moving a pointer for designating the frame to be reproduced from a cine memory that sequentially stores an ultrasonic signal received by an ultrasonic wave transmission/reception portion of the subject-side

5 apparatus per each frame;

an image formation portion that comprises a scan converting means for converting the number of scanning lines of an ultrasonic image data of the retransmitted frame, and forms an ultrasonic image by the scan converting means; and

10 a displaying means for displaying the ultrasonic image that is formed by the image formation portion.

[16] A remote ultrasonic diagnostic system in which the remote ultrasonic diagnostic subject-side apparatus according to Claim 14 and the remote

15 ultrasonic diagnostic examiner-side apparatus according to Claim 15 are connected via a communication line.